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Incentive Regulation and Utility Benchmarking for Electricity Network Security

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The introduction of incentive-based regulation of electricity networks led to the gradual adoption of cost and efficiency benchmarking as a powerful instrument by many European energy regulators. For example, Norway introduced incentive regulation and efficiency benchmarking in 1997 while Germany followed suit only in 2009. The primary rationale for benchmarking under incentive regulation is to decouple the allowed revenues of a network utility from its own costs in determining the regulated revenue cap based on the cost of the most efficient networks.

This paper discusses how output measures such as 'network security' can be utilised in benchmarking analysis within an incentive regulation framework. We conceptualize network security as encompassing the conventional elements of supply security such as short-run operational reliability; commercial reliability and long-run resource adequacy along with the security threats arising from natural, accidental and malicious (or exceptional) events facing the network. The paper defines an output metrics of network security to be incorporated in an output-oriented incentive regulation framework. The paper also aims to stimulate policy discussion on the conceptual and technical aspects of incorporating network security in incentive regulation and benchmarking analysis.

The reviews of different approaches to benchmarking networks suggest that undertaking robust benchmarking of network security pose challenges to energy regulators. The main stems from the differences in the treatment, accounting and classification of different types of security costs, the choice of appropriate variables to use as cost drivers and most importantly the lack of comprehensive and quality data related to network security. Nonetheless, network security output indicators can be defined and designed considering the existing data limitations and incorporate these in an incentive regulation framework. Our proposal to incorporate network security in incentive regulation is as follows. A network security metrics can be designed by including long unplanned interruptions of at least 5 minutes (which are more frequent than exceptional events). Long and unplanned interruption is a useful proxy for interruptions from exceptional events as they are long and affect many customers. Using long unplanned interruptions also increases data availability for benchmarking analysis to derive the metrics.

However, the adoption of statistical methods to account for exceptional events requires harmonisation of network security indicators and data collection procedures. This can be problematic in Europe because the understanding and definition of 'exceptional events' varies between the EU member countries where some countries adopt more statistical approaches while other countries qualitatively define exceptional events in terms of their causes. Not all EU countries publicly share the interruption statistics for exceptional events in their interruption database. From a benchmarking perspective, it is desirable that the interruptions statistics from exceptional events are recorded and shared among the member countries.

An alternative approach to assessing the usefulness and efficiency of network security investments is to undertake cost-effectiveness analysis (CEA) of the required investments. CEA analysis of security investments identifies the most economic or efficient way to undertake a given network security investment. CEA provides an ex ante evaluation to support decision-making relating to network security and guides the choices to be made by decision makers. However, both CBA and CEA analysis of network security investments will need to be accompanied with sensitivity analysis in order to validate and increase confidence in the results.

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